TACSM Abstract

Relationship Between Rate and Composition of Mass Gain During Overfeeding Plus Resistance Training

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ABSTRACT

A common goal among athletes is to gain additional body mass (BM), particularly fat-free mass (FFM), in order to improve muscle strength, power, and overall performance. Athletes typically undergo BM accretion over a specific period of time in conjunction with high-volume resistance training (RT) in order to preferentially gain FFM and promote concomitant muscular performance improvements. **PURPOSE**: The purpose of this study was to examine the relationship between the rate of BM gain and the proportion of BM gained as FFM versus fat mass (FM) during a 6-week period of overfeeding and resistance training. **METHODS**: 21 resistance-trained males (mean ± SD: age = 22.6 ± 2.5 years; height = 177.8 ± 6.8 cm; BM = 73.3 ± 12.3 kg, body fat % = 14.8 ± 5.1%, bench press [BP] 1-repetition maximum [1RM] = 1.3 ± 0.3, leg press [LP] 1RM = 3.3 ± 0.9) were recruited and assigned to 6 weeks of RT for 3-days/week and instructed to consume a high-calorie protein/carbohydrate supplement daily. Prior to the intervention, participants performed 1RM tests for the BP and LP exercises to assess training status, with the minimum requirement for study participation being BP 1RM ≥ 1.0xBM and LP 1RM ≥ 2.0xBM. At baseline and post-intervention, body composition assessments were performed using dual-energy x-ray absorptiometry (DXA), air displacement plethysmography (ADP), and bioimpedance spectroscopy (BIS) in order to produce a criterion 4-compartment model. Simple linear regression was performed to determine if the relative rate of mass gain predicted the composition of mass gain (calculated as the change in fat-free mass divided by the change in body mass). Assumptions of normality, outliers, homogeneity, and independence were examined and addressed as needed. **RESULTS**: The change in BM, FM, and FFM were (mean ± SD) 5.6 ± 2.3%, 1.3 ± 14.8%, and 6.0 ± 2.1%, respectively. In the regression model, the relative rate of mass gain significantly predicted the composition of mass gain (β: -0.81 [-1.11, -0.50], mean [95% confidence interval]). Based on these data, for every 1% increase in the rate of relative mass gain, the percent of mass gained as FFM decreased by approximately 10% (with a 95% confidence interval of -6 to -13%). A rate of mass gain of 0.93%/week corresponded to 100% of mass being gained as FFM, with slower rates allowing for simultaneous FFM gain and FM loss. **CONCLUSION**: For individuals who are moderately well-trained with respect to resistance training, a rate of BM gain of ~1%/week may allow for nearly all mass to be gained as FFM while slower rates may allow for simultaneous increases in FFM and decreases in FM.